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#8
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195463US

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF: :

HIROMITSU TANAKA ET AL : EXAMINER: YAMNITZKY, MARIE R.

SERIAL NO. 09/632,348 :

FILED: AUGUST 3, 2000 : GROUP ART UNIT: 1774

FOR: ELECTRO LUMINESCENT ELEMENT :

DECLARATION UNDER 37 C.F.R. §1.132

ASSISTANT COMMISSIONER FOR PATENTS
WASHINGTON, D.C. 20231

SIR:

Now comes Hiromitsu Tanaka, who deposes and states that:

1. I graduated from Kyoto University Faculty of Engineering Department of Synthetic Chemistry in 1989 with a master's degree. I have been an employee of Kabushiki Kaisha Toyota Chug Kenkyusho since 1989, where I have been engaged in organic chemistry.

2. I am an inventor of the above-identified U.S. patent application.

3. I understand the English language or, at least, that the contents of the Declaration were made clear to me prior to executing the same.

4. I have read and understand the Office Action of March 12, 2002, in the above-identified application.

5. I have read and understand the reference Suzuki et al. cited in the Office Action of March 12, 2002.

6. The comparative experiments disclosed herein were performed by me or under my direct supervision and control.

7. For a compound that contains an adamantyl radical and nitrogen at the para position of phenylen, the thermotolerance of the compound depends on the kineticism of the aromatic tertiary amine compound because the aromatic tertiary amine portion has superior kineticism to a rigid adamantly radical. Because the only degrees of freedom of the kineticism of aromatic tertiary amine compound are the rotation of bond p between the nitrogen and the aromatic ring and the rotation of bond q between the adamantine and the phenylen radical, a higher energy barrier will result in superior thermotolerance.

8. The rotation energy barrier can be estimated through calculation of strain energy due to steric hindrance according to the rotation angle. This calculation is performed using CS Chem 3D Pro Ver 3.5.0 of Cambridge Soft, which is commonly used in the field of organic chemistry. The steric energy of the rotation angles of the compounds of Fig. 1 is calculated, and a rotation energy barrier is calculated based on the obtained value. The results of the above-mentioned calculations are provided in Tables 1 and 2 below. Table 1

shows the results for bond p having substituents 1 and 2, which present a larger rotation energy barrier as compared to a case lacking them, while Table 2 shows the results for bond q having substituents 3 and 4. From these results, it is evident that Substituents 3 and 4 present a larger rotation energy barrier as compared to a case lacking them. The compounds in Tables 1 and 2 which correspond to (a1) to (a6) of claim 13 of the present invention are indicated accordingly in the leftmost column.

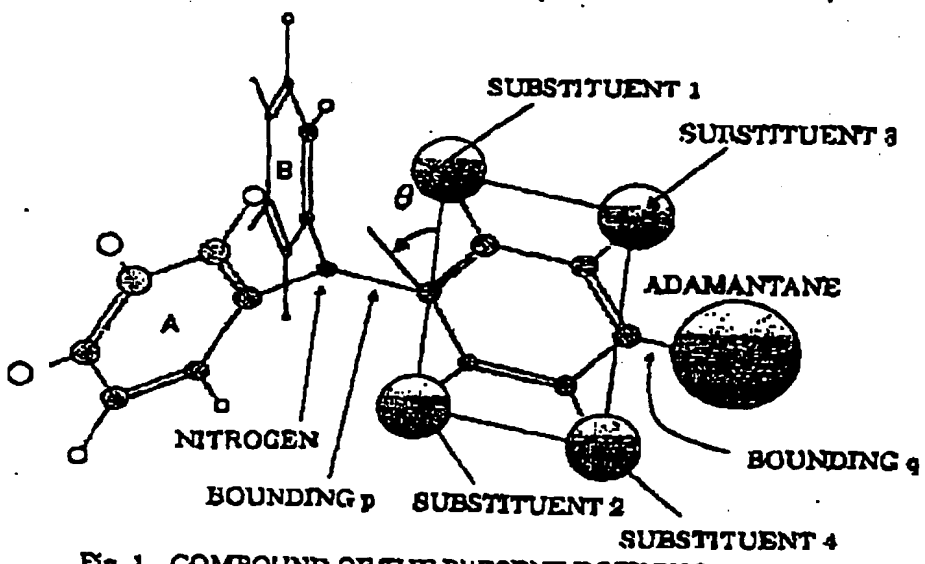

Fig. 1 COMPOUND OF THE PRESENT INVENTION

Table 1 - BOUNDING p ROTATION BARRIER ENERGY

Compounds in the Present Invention	Substituent 1	Substituent 2	Substituent 3	Substituent 4	Ring A	Ring B	Bounding p Rotation Barrier /kcal/mol
	H	H	H	H	Phenyl	Phenyl	22.8
	Me	H	H	H	Phenyl	Phenyl	62.7
(a3)	t-Bu	H	H	H	Phenyl	Phenyl	426.2
(a4)	Naphtyl	H	H	H	Phenyl	Phenyl	52.4
(a1)	Me	Me	H	H	Phenyl	Phenyl	134.1
	Naphtyl	H	H	H	Naphtyl	Phenyl	403.9
	Anthranyl	H	H	H	Phenyl	Phenyl	65.2
(a5)	Me	Me	H	H	Naphtyl	Naphtyl	480.9
(a6)	Me	Me	H	H	Anthranyl	Anthranyl	934.3

Table 2 - BOUNDING q ROTATION BARRIER ENERGY

Compounds in the Present Invention	Substituent 1	Substituent 2	Substituent 3	Substituent 4	Ring A	Ring B	Bounding q Rotation Barrier /kcal/mol
	H	H	H	H	Phenyl	Phenyl	253.4
(a2)	H	H	Me	Me	Phenyl	Phenyl	1606.1

9. From the data and results presented above, it is clear that the introduction of substituents to a compound having an adamantyl radical and N at the para position of phenylen enables improvement of its thermotolerance. Further, the claimed organic compound layer containing compounds (a1) to (a6) provide a larger rotation energy barrier as compared to compounds which lack them. Accordingly, the data provided above demonstrate that a compound having an adamantyl radical and N at the para position of phenylen enables improvement of its thermotolerance. The above mentioned larger rotation barrier of the claimed organic compound layer containing compounds (a1) to (a6), as well as their improved thermotolerance is statistically significant.

10. The undersigned petitioner declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this application or any patent issuing thereon.

11. Further deponent saith not.

Hiroto Tanaka
Signature

September 6, 2002
Date